

Application No.: 10/708,394

Docket No.: 22040-00030-US

REMARKS

Claims 1-14 remain pending in this application. Claims 1, 7, 12, and 14 are independent. Claims 1, 5, 6, 7, 12, and 14 have been amended, claim 15 has been canceled, and no claims have been added by this amendment.

Amendment to the Specification

The specification has been amended to correct an artifact of mathematical symbology resulting from the electronic filing of this application. No new matter is involved with this specification amendment.

Claim Objections

Withdrawal of the objection to claims 14 and 15 is requested. Claim 15 has been canceled, thus rendering this objection moot.

Unpatentability Rejection over Uramoto in View of Wilkinson

Withdrawal of the rejection of claims 1, 4-7, and 10-15 under 35 U.S.C. §103(a) as being unpatentable over Uramoto (US 5,910,904) in View of Wilkinson (JP 06-326555) is requested. Claim 15 has been canceled, thus rendering its rejection moot.

At the outset, Applicant notes that, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, *the prior art reference must teach or suggest all the claim limitations*.¹ Further, the teaching or suggestion to make the claimed combination and the

¹ See MPEP §2143.

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reasonable expectation of success must both be found in the prior art, not in applicant's disclosure.²

Specific Deficiencies

The applied art does not teach or suggest a sound quality adjusting device for causing an input sound signal to pass through a plurality of FIR digital filters, wherein the device includes, among other features, "a first FIR filter for multiplying a signal of each tap of a tapped delay line...according to given first filter factors...a second FIR filter for multiplying a signal of each tap of a tapped delay line...according to given second filter factors...", as recited in independent claim 1, as amended.

Further, the applied art does not teach or suggest an FIR filter device which includes, among other features, "a first FIR filter for multiplying a signal of each tap of a tapped delay line...according to given first filter factors...a second FIR filter for multiplying a signal of each tap of a tapped delay line...according to given second filter factors...", as recited in independent claim 7, as amended.

Still further, the applied art does not teach or suggest a sound quality adjusting method, which includes, among other features, "a first filtering step, implemented by a first FIR filter...[and] a second filtering step, implemented by a second FIR filter...", as recited in independent claim 12, as amended.

Finally, the applied art does not teach or suggest an FIR filter designing method for designing FIR digital filters, which includes, among other features, "setting frequency characteristics to be complementary to each other and allowing a total gain of the FIR digital filters to serve as a reference value at all frequencies...changing the sequence of the first filter coefficients and determining second filter coefficients having a second symmetrical sequence in which a sum of the second filter coefficients is zero and a sum of every other coefficient in the second symmetrical sequence is equal to a sum of the other every other coefficient having an

² *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) and *See* MPEP §2143.

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opposite sign, wherein the first filter coefficients and the second filter coefficients are used, respectively, as the filter factors of first and second FIR digital filters", as recited in independent claim 14, as amended.

Distinctions over the Applied Art

Uramoto only teaches or suggests use of infinite impulse response (IIR) filters involving feedback, and not finite impulse response (FIR) filters, which do not rely upon and therefore do not use feedback from succeeding stages to a preceding stage.

While Wilkinson may or may not teach or suggest that a sum of every other term is as recited in applicant's independent claim 1 as alleged by the Examiner, Wilkinson does not make up for the deficiencies of Uramoto with respect to providing a teaching or suggestion of the use of FIR filters.

The Examiner asserts that it would have been obvious to combine Uramoto with Wilkinson in the manner suggested to improve the audio output. Applicant respectfully traverses this alleged motivation to combine the references.

As is known in the art, and as compared to IIR filters, FIR filters offer the following advantages over IIR filters:

1. FIR filters can easily be designed to be "linear phase" (and usually are). Put simply, linear-phase filters delay the input signal, but do not distort its phase.
2. FIR filters are simple to implement. On most DSP microprocessors, the FIR calculation can be done by looping a single instruction.
3. FIR filters are suited to multi-rate applications. Multi-rate means either "decimation" (reducing the sampling rate), "interpolation" (increasing the sampling rate), or both. Whether decimating or interpolating, the use of FIR filters allows some of the calculations to be omitted, thus providing an

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important computational efficiency. In contrast, *if IIR filters are used*, each output must be individually calculated, even if that output will be discarded (so the feedback will be incorporated into the filter).

4. FIR filters have desirable numeric properties. In practice, all DSP filters must be implemented using "finite-precision" arithmetic, that is, a limited number of bits. The use of finite-precision arithmetic in IIR filters can cause significant problems due to the use of feedback, but FIR filters have no feedback, so they can usually be implemented using fewer bits, and the designer has fewer practical problems to solve related to non-ideal arithmetic.
5. FIR filters can be implemented using fractional arithmetic. Unlike IIR filters, it is always possible to implement a FIR filter using coefficients with magnitude of less than 1.0 (the overall gain of the FIR filter can be adjusted at its output, if desired.) This is an important consideration when using fixed-point DSP's, because it makes the implementation much simpler.

The case law relating to unpatentability holds that an essential evidentiary component of an obviousness rejection is a teaching or suggestion or motivation to combine the prior art references.³ Combining prior art references without evidence of a suggestion, teaching or motivation simply takes the inventors' disclosure as a blueprint for piecing together the prior art to defeat patentability – the essence of hindsight.⁴

"There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art."⁵ Further with regard to the level of skill of practitioners in the art, there is nothing in the statutes or the case law which makes "that which is within the capabilities of one

³ *C.R. Bard, Inc. v. M3 Systems, Inc.*, 48 USPQ2d 1225 (Fed. Cir. 1998)

⁴ *Interconnect Planning Corp. v. Feil*, 227 USPQ 543 (Fed. Cir. 1985)

⁵ See MPEP §2143.01, citing *In re Rouffet*, 149 F.3d, 1350, 1357, 47 USPQ2d 1453, 1457-8 (Fed. Cir. 1998).

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skilled in the art" synonymous with obviousness.⁶ The level of skill in the art cannot be relied upon to provide the suggestion to combine references.⁷

Because of the difference in the performance, implementation, and design principles relating to IIR filters and in contrast with FIR filters, applicant submits that a person with skill in the art would not be motivated to combine the IIR filters of Uramoto with Wilkinson to create the various FIR filter-related inventions claimed in each of independent claims 1, 7, 12, and 14.

Accordingly, withdrawal of the rejection and allowance of independent claims 1, 7, 12, and 14 are requested. Further, since dependent claims 2-6, 8-11 and 13 variously and ultimately depend from the allowable independent claims, these dependent claims are allowable at least on that basis, without recourse to the further patentable features recited therein. Allowance of dependent claims 2-6, 8-11 and 13 is also requested.

Unpatentability Rejection over Uramoto, Wilkinson, and Kovtun

Withdrawal of the rejection of claims 2, 3, 8, and 9 under 35 U.S.C. §103(a) as being unpatentable over Uramoto and Wilkinson in view of Kovtun (US 6,512,944) is requested.

While Kovtun may teach or suggest use of low-pass FIR filters in an ECG application, Kovtun does not make up for the deficiencies of Uramoto and Wilkinson noted above with respect to independent claims 1 and 7, discussed above.

Further, Kovtun additionally does not teach or suggest the recitations in independent claims 1 reciting that "the first filter factors have a symmetrical sequence in which values are set so that a sum is not zero and a sum of every other term is equal to a sum of the other every other term with the same signs; and the second filter factors have a symmetrical sequence in which values are set so that a sum is zero and a sum of every other term is equal to a sum of the other every other term with opposite signs."

⁶ *Ex parte Gerlach and Woerner*, 212 USPQ 471 (PTO Bd. App. 1980).

⁷ See MPEP §2143.01, citing *Al-Site Corp. v. VSI Int'l Inc.*, 50 USPQ2d 1161 (Fed. Cir. 1999).

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Similarly, Kovtun does not teach or suggest the limitations relating to the first and second filter factors recited in independent claim 7, above.

Further, applicant traverses the Examiner's assertion that Kovtun teaches or suggests that "in the second filter factors, signs of values other than a median of the sequence of the first filter factors are changed while causing absolute values of the sequence to remain the same," as recited in dependent claim 2. The portions of Kovtun cited and relied upon by the Examiner are submitted as being completely silent on teaching or suggesting this limitation.

Still further, applicant traverses the Examiner's assertion that Kovtun teaches or suggests that "in the second filter factors, signs of values other than a median of the sequence of the first filter factors are changed while causing absolute values of the sequence to remain the same, and the median of the sequence is subtracted from a reference value," as recited in dependent claim 3.

Similar arguments as above are submitted as being relevant to the non-obviousness of the subject matter of dependent claims 8 and 9.

In summary, Kovtun does not teach or suggest that for which it is offered by the Examiner at least with respect to claims 2-3 and 8-9, and does not make up for the deficiencies of Uramoto and Wilkinson identified above.

In addition, the Examiner's assertion of motivation to combine Uramoto, Wilkinson, and Kovtun in the manner suggested, i.e., that it would be obvious to "to provide an improved, low-pass filter capable of removing noise signal component from higher frequency signal" is deficient.

Removing a noise component from a higher frequency signal is not a stated objective of the present application. Further, applicant submits that all low pass filters act to remove noise signal from a higher frequency signal, to varying degrees.

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Accordingly, since the applied art does not teach or suggest all the claimed limitations, and since the motivation to combine the references in the manner suggested, a *prima facie* case of unpatentability has not been established. Allowance of claims 2-3 and 8-9 is requested.

Conclusion

In view of the above amendment and remarks, applicant believes that each of pending claims 1-14 in this application is in immediate condition for allowance.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, under Order No. 22040-00030-US from which the undersigned is authorized to draw.

Respectfully submitted,

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